REMARKS

Claims 26-34 are presently pending in the application.

Claims 29-34 stand allowed for the reasons set forth previously. However, the Examiner has maintained his rejections of claims 26 and 27 under 35 U.S.C. § 103(a) as being unpatentable over JP 11-219701 ("JP '701") in view of JP 08-203508-A ("JP '508") and U.S. Patent No. 6,083,642 of Kato ("Kato"). Further, claim 28 has been rejected under § 103(a) as being unpatentable over JP '701 in view of JP '508 and Kato and further in view of U.S. Patent No. 4,837,119 of Ikoma ("Ikoma"). Applicants respectfully traverse these rejections and the arguments in support thereof as follows, and respectfully requested reconsideration and withdrawal of the rejections. While the Examiner's bases for rejection have been summarized in previous responses, they will be repeated here for completeness

Rejection of Claims 26 and 27 Under 35 U.S.C. § 103(a
Based on JP '701 and JP '508 in View of Kato

The Examiner argues that JP '701 discloses a positive electrode for an alkaline storage battery containing a first active material and a second active material where the first active material comprises X parts by weight of nickel hydroxide (X being 90-60 weight percent of the first and second active materials) with aX/100 parts by weight of cobalt oxyhydroxide (aX/100 being 1-10 weight percent of cobalt oxyhydroxide), and the second active material comprises Y parts by weight of particulate nickel oxyhydroxide (Y being 10-40 weight percent of the first and second active materials) and bX/100 parts by weight of cobalt oxyhydroxide (bX/100 being 1-10 weight percent of cobalt hydroxide). The Examiner contends that the nickel in the second active material has an inherent oxidation number α and that the nickel hydroxide and/or the nickel oxyhydroxide contains at least one of cobalt, zinc, cadmium, magnesium, calcium, manganese, and aluminum.

The Examiner acknowledges that JP '701 does not explicitly disclose the oxidation number of the nickel in the second active material to be from 2.6 to 2.92, but contends that JP '508 discloses that nickel valence levels from 2.2-3.4 are known and that JP '508 also cites a specific value of 2.8. Therefore, the Examiner argues that selection of a nickel valence level between 2.2-3.4 encompasses the instant claimed range, and that the specific value of 2.8 is also within the instant claimed range. The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '701 by selecting the nickel valence of JP '701 to be from 2.6 to 2.92, since it would have optimized the charge and discharge cycle of the electrochemical cell.

The Examiner acknowledges that JP '701 and JP '508 do not teach that the oxidation number of the cobalt in the oxyhydroxide in the active materials is greater than 3. However, the Examiner argues that Kato discloses a process in which the nickel active material is coated with cobalt having an oxidation number greater than 3, and that using a higher valence cobalt material provides a positive electrode material having high active material utilization and improved overdischarge withstanding characteristics. Therefore, the Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of JP '701 by providing a higher valence cobalt material to provide such favorable properties.

In the Advisory Action dated February 17, 2004, the Examiner argued that the Kato clearly teaches the advantages of using cobalt with an oxidation state greater than 3, and that although the prior art has different motivation to combine, there is motivation nonetheless. Further, in the present Office Action, the Examiner contends, citing *Ex parte Obiaya*, that the fact that Applicants have recognized another advantage which could flow naturally from the

suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. Additionally, the Examiner argued that the original disclosure does not set forth clear evidence supporting the unexpected results of the claimed combination of specific nickel and cobalt valences, but appears more particularly drawn to the specifics of the nickel valence limitations.

The Examiner maintains that the terms "positive" and "negative" as recited in the claims and in the prior art are not drawn to opposite electrodes in a cell, but rather to the same electrode. One skilled in the art would thus allegedly recognize that the materials in the prior art and the claimed invention are the same and thus drawn to the same electrode in a given cell. More specifically, the Examiner contends that the terms "positive" and "negative" are terms given to an electrode in relation to the charging or discharging cycle, and that while the prior art Japanese references use the term "negative" when referring to an electrode, this term is relative to the cycle (charging or discharging) of the cell. Therefore, a positive electrode in Japanese references represents the positive electrode in charging mode but in U.S. references represents the positive electrode in the discharging mode of the same cell. Accordingly, the Examiner concludes that a negative electrode in a discharging state is the same as a positive electrode in a charging state. Since the prior art electrode materials are allegedly the same as the claimed materials, the Examiner asserts that the claimed positive electrode (positive in the discharge state) is the same as a negative electrode (negative in the charge state). In other words, the Examiner concludes that the negative electrode of the prior art in a discharge mode will effectively be a positive electrode.

In view of these conclusions, the Examiner argues that it would be readily apparent to one of ordinary skill in the art that the terms "positive" and "negative" are not

sufficient limitations in a rechargeable battery, in which each electrode cycles from positive to negative relative to whether the battery is charging or discharging, and that Applicants have not provided convincing arguments as to the difference between the terms "positive" and "negative" in the prior art of record and in the claims.

Finally, the Examiner contends that while the present claims recite nickel metal hydride batteries and JP '508 teaches nickel cadmium batteries, the electrochemical characteristics of both batteries are similar and the positive electrode materials of both types of batteries are the same, as allegedly taught by the newly cited reference of Linden. Since the positive electrode material in both nickel metal hydride and nickel cadmium batteries are allegedly the same, the Examiner concludes that one having ordinary skill in the art would have found it reasonable to combine positive electrode materials used in either type of cell. Applicants respectfully traverse this rejection as follows.

JP '508 discloses that addition of a nickel compound having a nickel valence of 2.2 to 3.4 to a paste-type cadmium negative electrode elongates the cycle life of a nickel-cadmium storage battery. Since a trace amount (0.05 to 1.0 wt%) of the nickel compound, added to the cadmium negative electrode of the nickel-cadmium storage battery, inhibits coagulation of cadmium during the charge/discharge cycles, the above effect is achieved. Further, limiting the valence of the nickel compound to 2.2 to 3.4 allows more effective inhibition of the cadmium coagulation because this nickel compound has a larger surface area than a nickel compound having a valence of 2 (nickel hydroxide). JP '508 thus teaches modification of the negative electrode to inhibit its deterioration. However, there is no teaching or suggestion that these modifications would be applicable to the positive electrode.

On the other hand, JP '701 relates to a modification of a positive electrode to provide a suitable discharge reservoir in a negative electrode of an alkali storage battery. More specifically, JP '701 discloses a positive electrode comprising a first active material and a second active material mixed in a predetermined ratio.

For these reasons, JP '508 and JP '701 are different in purpose, means for accomplishing the purpose, and effect achieved. JP '508 does not include any description of the discharge reservoir and is silent about any modification of the positive electrode. Since JP '508 is directed to the inhibition of cadmium coagulation in the negative electrode and not to the modification of the positive electrode, there would be no motivation to limit the nickel valence of the second active material in the positive electrode to 2.2 to 3.4. Therefore, it would not be obvious for one skilled in the art to combine JP '508 and JP '701.

Further, one skilled in the art would not be motivated to combine JP '508 and JP '701 and to apply a negative electrode that improves the charge/discharge cycle life of a nickel-cadmium storage battery to a positive electrode of a nickel metal hydride storage battery or the like. Since the positive and negative electrodes are completely different in potential range during the operation and electrochemical function, the excellent structure employed for a negative electrode cannot be always favorable to the same degree when it is applied to a positive electrode.

For the reasons explained in detail below, Applicants respectfully traverse the Examiner's conclusions regarding the interchangeability of the terms "positive" and "negative" as they relate to the electrodes in a cell, as well as the Examiner's conclusions that one of ordinary skill in the art would have found the teaching of JP '508 to be equally applicable to either positive or negative electrodes in rechargeable batteries which employ nickel as an active

material for the purpose of optimizing the charge and discharge characteristics of the electrode.

If the Examiner maintains this position, which to date is unsupported, he is requested to support his statements concerning interchangeability of positive and negative electrodes and U.S. versus Japanese references with literature citations.

The voltage of a battery is generated by a difference between the electrochemical potentials of a positive electrode active material and a negative electrode active material. In a Ni/Cd battery, nickel hydroxide and a cadmium compound are used as the positive and negative electrode active materials, respectively. On the other hand, a Ni/MH battery adopts nickel hydroxide and a hydrogen-absorbing alloy as the positive and negative electrode active materials, respectively (see Table 1).

Table 1   Active materials for positive and negative electrodes of each battery system

|		Active Materials	
		Positive Electrode	Negative Electrode
Battery System	Ni/Cd Battery Nickel / Cadmium	Nickel Hydro-Oxide $Ni^{2.X+} \Leftrightarrow Ni^{3.Y+}$	Cadmium (Metal $\Leftrightarrow$ Hydro-Oxide) $Cd^{2+} \Leftrightarrow Cd^{0+}$
	Ni/MH Battey Nickel / Metal Hydride	Nickel Hydro-Oxide $Ni^{2.X+} \Leftrightarrow Ni^{3.Y+}$	Metal Alloy $M \Leftrightarrow MH$ M:Metal , H:Hydrogen

Discharge State $\Leftrightarrow$ Charge State

It is known that a Ni/Cd battery and a Ni/MH battery have almost the same battery voltage (about 1.2 V). Since both batteries utilize the same positive electrode active

material, the cadmium compound in the Ni/Cd battery and the hydrogen-absorbing alloy of the

Ni/MH battery are considered to have nearly the same electrochemical potentials.

Even a general user can easily measure the voltage behavior of a Ni/Cd battery or

a Ni/MH battery during charge/discharge cycles. FIG. 1-A illustrates an example of the battery

voltage behavior measured using a voltage measurement device.

FIG. 1-A   Battery voltage behavior during charge/discharge cycles
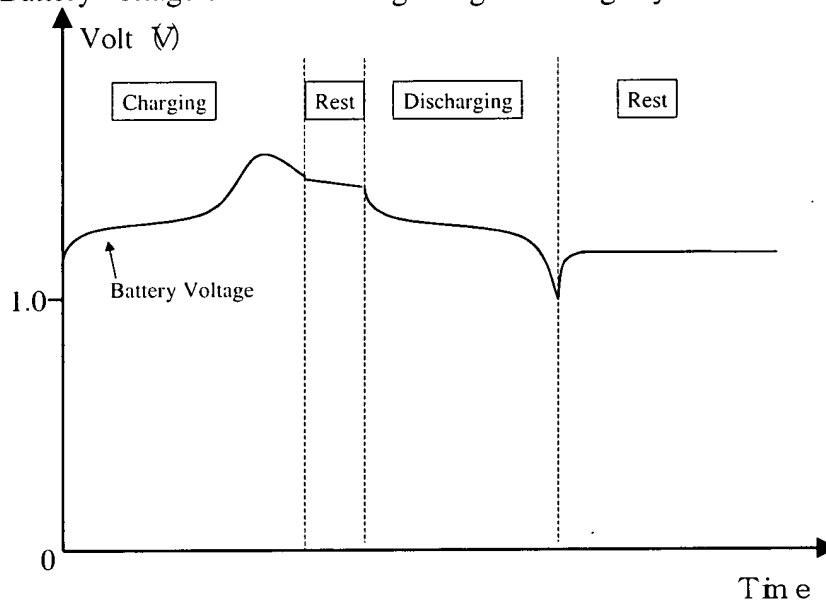
A skilled person conversant with electrochemistry can measure potential

variations in the positive and negative electrodes at the same time. More specifically, a third

electrode is used as a reference electrode to measure the potentials of the positive and negative

electrodes with respect to the reference electrode. Such a measurement is called a three-

electrode measurement.

FIG. 1-B shows potential variations in the positive and negative electrodes of the

Ni/Cd battery or the Ni/MH battery through the charge/discharge cycles. The potential variations

were obtained by the three-electrode measurement using a mercury electrode (Hg/HgO) as the

reference electrode.

FIG. 1-B   Potential behavior of positive and negative electrodes
during charge/discharge cycles
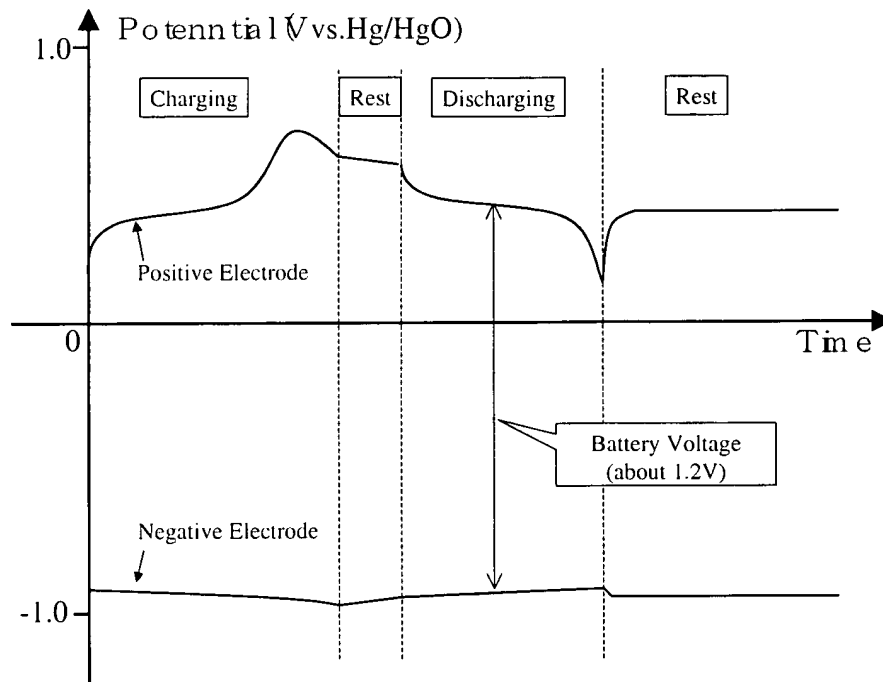
The results shown in FIG. 1-B indicate that the potential of the positive electrode

is always higher than that of the negative electrode in every state of charge, discharge and rest.
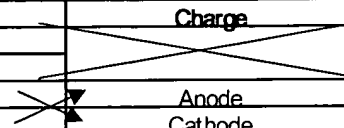
In view of this, it can be understood that:

(1) a positive electrode of a battery always shows a higher potential than a

negative electrode;

(2) a positive electrode of a battery does not change polarity according to whether

it is in the charging state or discharging state; and

(3) a negative electrode in the discharging state and a positive electrode in the

charging state are completely different and cannot be regarded as the same.

Further, the positive electrode of the battery is electrically connected with a plus terminal of the battery at all times. In the Examiner's opinion, the battery terms "positive electrode" and "negative electrode" are mixed up with the electrochemistry terms "anode" and "cathode". However, in electrochemistry, the anode is defined as being a field for oxidation and the cathode as being a field for reduction. Table 2 shows the differences among the relevant terms.

Table 2   Polarity of batteries and polarity in electrochemical reactions

	Terminal	Electrode	Discharge	Charge
Primary Battery	(+)	Positive	Cathode	
	(-)	Negative	Anode	
Secondly Battery (Rechargeable)	(+)	Positive	Cathode	Anode
	(-)	Negative	Anode	Cathode
Notice) · Positive Electrode is connected with (+)Plus Terminal of the Battery · Negative Electrode is connected with (-)Minus Terminal of the Battery · Cathode Electrode is Deoxidation Electrode · Anode Electrode is Oxidation Electrode				

For all of these reasons, the terms "positive" and "negative" as they relate to the electrodes in a cell are not interchangeable, and one of ordinary skill in the art would not have found the teaching of JP '508 to be equally applicable to either positive or negative electrodes in rechargeable batteries which employ nickel as an active material for the purpose of optimizing the charge and discharge characteristics of the electrode.

The present claims recite a nickel metal-hydride storage battery, not a nickel-cadmium storage battery as taught in JP '508. A nickel metal-hydride storage battery as claimed does not contain cadmium in both the positive and negative electrodes. Thus, the target of the modification in JP '508 is not included in the present invention.

Applicants respectfully traverse the Examiner's contention that the positive electrode materials in nickel metal hydride and nickel cadmium batteries are the same, and that

the electrochemical characteristics of these types of batteries are similar. The favorable effects of the present invention are particularly exhibited in nickel metal-hydride batteries as follows. In both nickel-cadmium storage batteries and nickel metal-hydride batteries, gas is generated in the battery in an overcharged state. However, in nickel metal-hydride batteries, the positive electrode generates oxygen gas, while the negative electrode generates hydrogen gas, both due to electrolysis of water in the electrolyte. The oxygen gas generated in the positive electrode is transferred to the negative electrode and reacts with hydrogen gas to form water. On the other hand, the hydrogen gas generated in the negative electrode is chemically absorbed into the hydrogen absorbing alloy in the negative electrode. The negative electrode contains the hydrogen absorbing alloy in an excess amount with respect to the positive electrode capacity (called a charge reservoir), so that it can absorb hydrogen even in a fully-charged state. The negative electrode is provided with a discharge reservoir so that the negative electrode can discharge even when the positive electrode is fully discharged.
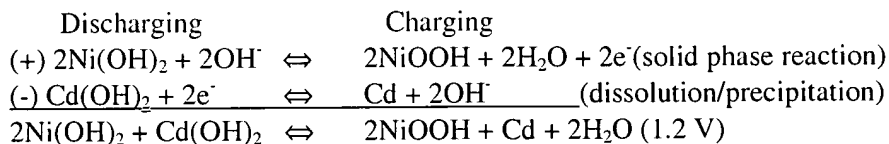
If the discharge reservoir increases to an excess degree, the charge reservoir will decrease by the excess of the discharge reservoir, even though the total amount of the hydrogen absorbing alloy has not changed. This decrease reduces room for absorbing hydrogen in the overcharged state. As a result, the hydrogen gas generated in the negative electrode in the overcharged state cannot be absorbed at a sufficiently high rate. Therefore, it is essential to limit the discharge reservoir to the minimum required level, and the discharge reservoir should be controlled with precision. Furthermore, variations in discharge and charge reservoirs after the battery has been assembled should be avoided as much as possible. In particular, increases in discharge reservoir (decreases in charge reservoir) should preferably be avoided.

On the other hand, a nickel-cadmium storage battery is designed so that no hydrogen gas is generated from the negative electrode in the overcharged state, since the negative electrode of this type of battery cannot chemically absorb hydrogen gas. Accordingly, the capacity of the cadmium negative electrode in the nickel-cadmium storage battery is typically far larger than the positive electrode capacity. For example, the negative electrode is designed to be twice as large in theoretical capacity as the positive electrode to give a sufficient allowance to the charge reservoir.
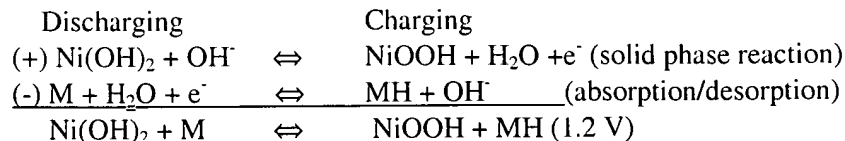
Therefore, since the capacity of the cadmium negative electrode has a sufficient allowance, even if the discharge reservoir increases to some degree, the influence of this increase is far smaller than in a nickel metal-hydride storage battery. That is, while optimization of the discharge reservoir is especially important for a nickel metal-hydride battery, its effect is extreme. The opposite is true with a nickel-cadmium storage battery.

The Examiner argues that the reference teaches that Ni/MH and Ni/Cd batteries are similar. Applicants do not disagree that in a broad sense, both batteries adopt nickel oxide as the positive electrode active material and an aqueous alkaline solution as the electrolyte, and exhibit battery voltages of the same level. The electrode reaction formulas of Ni/MH and Ni/Cd batteries are as follows:

[Ni/Cd battery]

Discharging		Charging
(+) $2Ni(OH)_2 + 2OH^-$	$\Leftrightarrow$	$2NiOOH + 2H_2O + 2e^-$ (solid phase reaction)
(-) $Cd(OH)_2 + 2e^-$	$\Leftrightarrow$	$Cd + 2OH^-$ (dissolution/precipitation)
$2Ni(OH)_2 + Cd(OH)_2$	$\Leftrightarrow$	$2NiOOH + Cd + 2H_2O$ (1.2 V)

[Ni/MH battery]

Discharging		Charging
(+) $Ni(OH)_2 + OH^-$	$\Leftrightarrow$	$NiOOH + H_2O + e^-$ (solid phase reaction)
(-) $M + H_2O + e^-$	$\Leftrightarrow$	$MH + OH^-$ (absorption/desorption)
$Ni(OH)_2 + M$	$\Leftrightarrow$	$NiOOH + MH$ (1.2 V)

However, both types of batteries are significantly different in terms of balance between the positive electrode capacity and the negative electrode capacity, and correspondingly, they are also different in electrochemical requirement for the positive electrode.

A reaction of a negative electrode of the Ni/Cd battery (hereinafter referred to as a cadmium negative electrode) involves precipitation of metallic cadmium (metal: highly conductive) and dissolution of cadmium hydroxide (oxide: conductivity is very low). Since the negative electrode reaction includes a process of precipitating the active material after the dissolution thereof, the reaction speed is very slow. Accordingly, the cadmium negative electrode is designed to hold an excess quantity of electricity in addition to a quantity of electricity required for reaction with the positive electrode. Thereby, the electrode potential can be maintained for a long time during the discharge. This excess quantity of electricity is called a discharge reserve. The discharge reserve in the cadmium negative electrode is provided by generating an excess of metallic cadmium in the negative electrode relative to the positive electrode capacity.

The excess of metallic cadmium may be formed by the following methods:

(a) a method using a low valence compound (e.g., Ni^{2+}) as the positive electrode active material; and

(b) a method using a metallic compound having as low valence as possible (e.g., Co or Co^{2+}) as an auxiliary agent other than the positive electrode active material (e.g., metallic cobalt, cobalt hydroxide or cobalt oxide).

In the former method, the positive electrode active material (Ni^{2+}) is oxidized to Ni^{3+} by charging. However, during discharge, it is not reduced back to the original state, but

13

only to ($Ni^{2.2+}$). Therefore, metallic cadmium corresponding to the quantity of electricity of "$Ni^{2+} \rightarrow Ni^{2.2+}$" can be generated in the negative electrode.

In the latter method, the auxiliary agent Co^{2+} is oxidized in the positive electrode. However, it is not reduced during the normal charge/discharge cycles of the battery and therefore always remains in the oxidized state. Accordingly, for example, metallic cadmium corresponding to the quantity of electricity of "$Co^{2+} \rightarrow Co^{3+}$" can be generated in the negative electrode.

The cobalt compound is oxidized in the positive electrode of the battery to have conductivity and a valence higher than 2, which enhances the conductivity of the positive electrode and realizes a smooth electrode reaction.

On the other hand, it is becoming understood that the negative electrode of the Ni/MH battery performs quick charge/discharge reaction, and therefore does not require a large discharge reserve. This indicates that a highly oxidized active material can be used in part of the positive electrode of the Ni/MH battery and that an auxiliary agent having a high valence can be added only to give conductivity. The present invention has been achieved based on these findings (see FIG. 2).

In particular, the auxiliary agent is preferably a cobalt compound which is highly oxidized to show extremely high conductivity and whose valence does not increase. That is, if a material whose valence does not increase is used in the battery, an excess discharge reserve is not formed in the negative electrode and the amounts of the active materials for the positive and negative electrodes contributing to the battery reaction can be increased. Thus, a high capacity battery can be manufactured.

14

FIG. 2 Balance between positive electrode capacity and negative electrode capacity in each battery
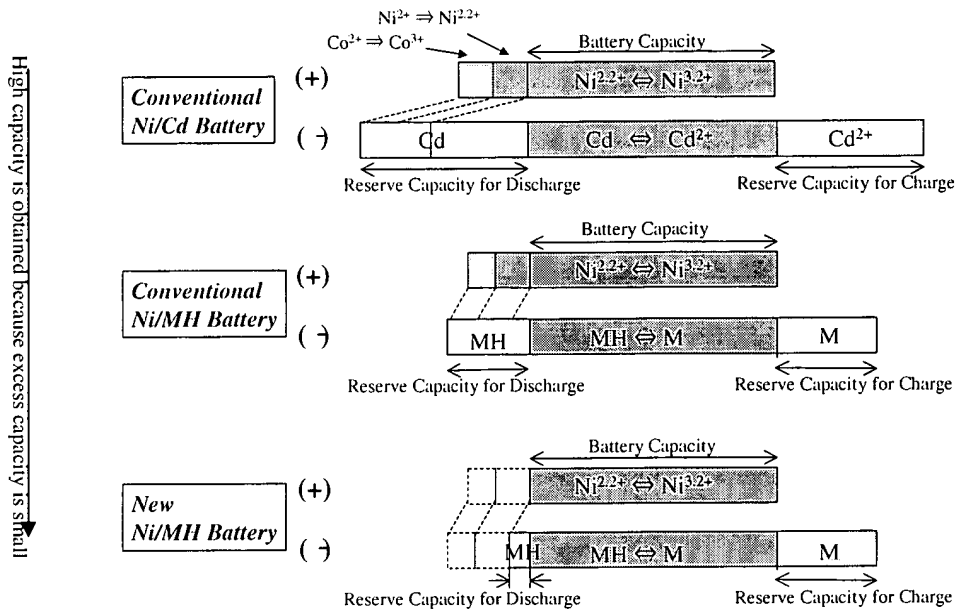

FIG. 2 illustrates a relationship between the positive electrode capacity and the negative electrode capacity of a conventional Ni/Cd battery, a conventional Ni/MH battery and a Ni/MH battery according to the present invention. The diagram indicates that the Ni/MH battery according to the present invention can reduce the excess of negative electrode capacity with respect to the positive electrode capacity, as compared with the two conventional batteries.

On the other hand, as described above, the Ni/Cd battery requires a certain amount of discharge reserve. Accordingly, if the present invention were to be applied to a Ni/Cd battery, the discharge reserve in the negative electrode would become insufficient, which could possibly cause a decrease in discharge capacity. Therefore, the present invention is most effective at increasing the capacity of a Ni/MH battery.

According to the above, the Ni/Cd battery and the Ni/MH battery are significantly different in terms of balance between the positive electrode capacity and the negative electrode

·capacity. As a result, the batteries are completely different in their state and function even if the active materials for the positive electrodes are the same. Specifically, the negative electrode material for the Ni/MH battery is higher in capacity than that of the Ni/Cd battery. Although the Ni/Cd battery generates water during charging, the Ni/MH battery does not. Therefore, the positive and negative electrode active materials can be filled in larger amounts in the sealed system. Therefore, the Ni/MH battery has higher capacity than the Ni/Cd battery. To bring the capacity of the Ni/MH battery to a higher level, sophisticated techniques are required. The present invention provides a revolutionary means to fulfill such severe requirements and is highly valuable from a technological aspect.

Since significant differences between nickel metal-hydride and nickel cadmium batteries have been demonstrated, Applicants respectfully submit that there would clearly be no motivation to apply the teachings of JP '508 to JP '701 or to the present invention.

The present invention is directed principally to pursuing the reduction of the discharge reservoir of a battery as compared with conventional batteries. Applicants have found that this goal may be achieved preferably by utilizing a combination of cobalt oxyhydroxide having a cobalt valence greater than 3 in the active materials and nickel having an oxidation number of ≥ 2.6 and ≤ 2.92. Further, the use of such cobalt oxyhydroxide provides several advantages over prior art batteries.

First, if the valence of cobalt is initially less than 3, it may change to 3 during charge/discharge cycles, resulting in the undesirable production of a discharge reservoir while the valence of cobalt is changing to 3 in the battery (see specification page 3, line 22 to page 4, line 4). If Co contained in the positive electrode has a valence of 3 or less, it is oxidized to increase the valence to larger than 3 during the charge. At this time, the discharge reservoir of

16

the negative electrode increases, because an oxidation reaction of cobalt consumes part of the

charged power in the positive electrode, while the charging reaction of the negative electrode

consumes the entire charged power in the negative electrode.

On the other hand, if cobalt oxyhydroxide with a valence of cobalt greater than 3

is used initially, the valence does not change and the formation of such an excessive discharge

reservoir can be eliminated. When the Co valence is 3 or less, the positive and negative

electrodes will differ in the amount of accepted electric power even if they are given the same

amount of electric power. Thereby, the discharge reservoir increases. To avoid this

inconvenience, it is effective to initially set the Co valence higher than 3. In other words, it is

essential to stabilize Co to inhibit to the greatest possible extent a side reaction caused by Co.

Kato does not teach or suggest that variations in discharge and charge reservoirs can be inhibited

by initially setting the Co valence higher than 3. Accordingly, the present invention

demonstrates unexpected results which would not be expected based on the proposed

combinations of cited references.

Second, since cobalt oxyhydroxide with a cobalt valence greater than 3 is very

stable throughout the long cycle of charge/discharge, it is possible to prevent changes of the

discharge reservoir resulting from cobalt valence changes, as well as to accurately maintain the

discharge reservoir to be an appropriate small amount throughout the long cycle.

Finally, the utilization rate of the second active material can be improved by using

cobalt oxyhydroxide with a cobalt valence greater than 3. In order to efficiently obtain the

second active material, the first active material is used as the starting material and then subjected

to an oxidation treatment to obtain the second active material. If the valence of cobalt in the

surface layer of the first active material is 3 or lower, the utilization rate of the second active

material will become low compared with the utilization rate of the starting first active material. This may be because the cobalt with a valence of 3 or lower adversely affects the produced second active material.

In contrast, if the valence of cobalt in the surface layer is greater than 3 (such as 3.12 or 3.19), the second active material utilization rate is almost the same as that before the oxidation. The cobalt compound with a cobalt valence greater than 3 has a structure in which alkali metal ions are intercalated between the layers, and is thus more stable than that with a valence of 3 or lower.

In summary, by using cobalt oxyhydroxide with a cobalt valence greater than 3, combined with regulating the mean valence of nickel, it is possible according to the present invention to:

(a) eliminate the excessive discharge reservoir due to the valence change of cobalt;

(b) avoid the variation in the discharge reservoir throughout the long cycle; and

(c) prevent the second active material utilization rate from decreasing.

Kato teaches coating nickel active material with cobalt having an oxidation number greater than 3 for providing a high active material utilization rate and improved overdischarge withstanding characteristics. However, Kato does not teach or suggest that regulating the valence of cobalt in cobalt oxyhydroxide would additionally stabilize the cobalt oxyhydroxide, which significantly affects and optimizes the discharge reservoir. Accordingly, it would not be expected based on the proposed combination that to apply cobalt oxyhydroxide with a valence of cobalt greater than 3 to JP '701 and JP '508, combined with regulating the mean valence of nickel contained in the positive electrode as claimed, would (a) eliminate the

excessive discharge reservoir due to the valence change of cobalt; (b) avoid the variations in the discharge reservoir; and (c) prevent the second active material utilization rate from decreasing.

Additionally, as previously demonstrated, it would not be expected based on the proposed combination of references that the amount of the discharge reservoir of the negative electrode can be optimized by regulating the mean valence of nickel in the positive electrode. As a result, it is possible to reduce the amount of expensive hydrogen storage alloy to be used, thus enabling the production of a low-cost battery with a high energy density (page 31, lines 6 to 11). For example, a battery with a negative electrode discharge reservoir capacity of not greater than 10% more than the positive electrode discharge reservoir capacity (such as recited in claim 28 and described at page 27, line 17 to page 28, line 16 and in Tables 1 and 2) can be produced. As shown in Tables 1 and 2, the batteries according to the present invention (1, 2, and 3) exhibited favorable properties relative to the comparative examples, which is due in part to the difference in oxidation number of nickel in the positive electrodes. It is noted that Comparative Example 13 is the example from JP '701, which is clearly inferior to the presently claimed electrodes. This demonstrates the superiority of the present invention over the prior art.

For all of these reasons, even if a prima *facie* case of obviousness had been established by the Examiner based on any of the proposed combinations of references, it would be overcome by all of the unexpected results exhibited by the present invention. Accordingly, reconsideration and withdrawal of the § 103(a) rejection are respectfully requested.

Rejection of Claim 28 Based on JP '508, JP '701, Kato and Ikoma

The Examiner acknowledges that JP '508, JP '701, and Kato do not teach that the battery further comprises a negative electrode comprising a hydrogen storage alloy, a separator, an aqueous alkaline electrolyte solution, a sealing plate having a safety valve and a battery case

as claimed, but contends that such modifications of the overall components of the battery would have been readily apparent. Further, the Examiner argues that Ikoma discloses a sealed storage battery comprising a positive electrode, negative electrode, separator, aqueous electrolyte solution, and a sealing plate having a safety valve. Therefore, the Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of JP '701 by providing a negative electrode and electrolyte solution to effectively enable charge transfer from the positive electrode to a second electrode across the electrolytic medium, to use a separator to electrically isolate the positive and negative electrode materials, to provide a sealing plate to the open end of a battery to seal the battery components within the battery and isolate them from the external environment, and to provide a safety valve in the sealing plate to compensate for internal pressure fluxes.

Applicants once again point out that Ikoma teaches a sealed storage battery comprising a positive electrode, a negative electrode, an alkaline electrolyte, a separator, and a sealing plate having a safety valve. However, Applicants claim a nickel metal-hydride storage battery having a paste type positive electrode and a discharge capacity of the negative electrode which is 1 to 1.1 times larger than that of the positive electrode. Even if the proposed combination of JP '701, JP '508 and Kato were proper, the combination would not teach or suggest all of the claimed elements, and Ikoma does not cure these deficiencies.

Accordingly, no *prima facie* case of obviousness has been established based on the proposed combination of JP '701, JP '508, Kato, and Ikoma, and reconsideration and withdrawal of the § 103(a) rejection are respectfully requested.

Based on the preceding Remarks, it is respectfully submitted that the pending claims are patentably distinct from the prior art of record and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

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